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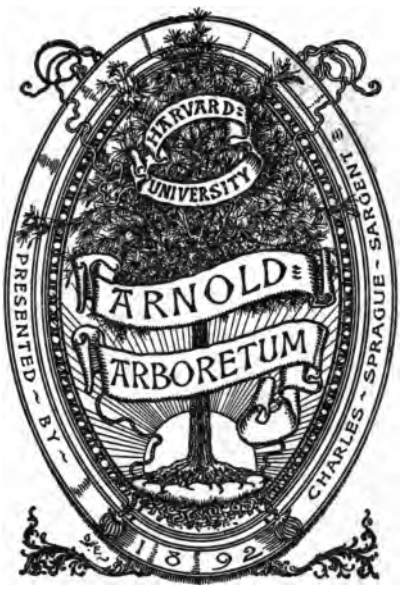

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THE SCHOOLS OF FORESTRY

AND

INDUSTRIAL SCHOOLS OF EUROPE,

WITH OTHER PAPERS.

BY

B. G. NORTHROP,

SECRETARY CONNECTICUT BOARD OF EDUCATION.

NEW YORK:
THE BRADLEY AUDD COMPANY,
141 BROADWAY.
1880.

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A few local allusions in these papers, reprinted from the Report of the Connecticut Board of Education for 1878, are retained to show the original aim of the writer, and the application of kindred plans and principles to other fields.

SCHOOLS OF FORESTRY.

The experience of Europe long since demonstrated the value and necessity of "Forest Schools" so numerous on the Continent. As these institutions are unknown in this country, a detailed statement of their aims and character will not only be of interest, but I hope, will help towards the organization of similar schools in America. In connection with either of our Colleges, the endowment of two additional professorships, or even one at the outset, might inaugurate a Department of Forestry. As the applied mathematics and the sciences comprise so large a part of the curriculum of Forest Schools, a Forest Department could very easily and economically be annexed to the Sheffield Scientific School, where the existing cabinets, laboratories and philosophical apparatus could be utilized in forestral instruction. The endowment of such a department would prove a great benefaction to the State and to the country, opening new fields of investigation which would bear directly on the ultimate resources and permanent prosperity of the country. The conclusions of foreign foresters, though confirmed by the broadest observations and experience in Europe, cannot all be wisely adopted in American Sylviculture. Difference in soil, climate, and other conditions may affect trees in regard to their rapidity of growth, health, durability of timber, texture, elasticity and grain of the wood, and many other qualities. These vital questions can be determined only by careful investigations carried on in each country. The Lombardy poplar, for example, sending out its almost upright laterals from the very ground all along its tall stem, grows beautifully in Italy, and is still a favorite with the Italians as of old with the Romans, who, it is said, gave it the name *arbor populi*. But in New England so many of its branches winter-kill that it soon becomes an unsightly collection of dead limbs.

Another object of my recent visit to the leading schools of Forestry in Europe was to gather the practical plans and suggestions embodied in my paper on "Economic Tree Planting," first published in the Report of the Connecticut Board of Agriculture, and thus help reclaim our ex-

hausted lands by tree planting. As these lands have been abandoned to hopeless sterility, and their reclamation has already been pronounced a visionary and impracticable scheme, I have shown that the experiment of reclaiming vast barrens in France, Germany, Russia, Austria, and other European countries has been tried with conspicuous success. What has been done on so broad a scale and with such grand results in Europe surely can be accomplished in the comparatively narrow barrens of the New England States.

Another purpose of my journey was to do something towards making our youth practical arborists by awakening a love of trees and an interest in their study and culture. From a wide field of observation, I tried to collect such facts as seem fitted to further the work of rural adornment, in which encouraging progress has already been made in our State. A few oral lessons in our schools on rural art, and especially on the beauty, variety and value of trees and the ease and ways of their propagation, would be as good seed sown in good ground bringing forth fruit an hundred fold. Very little time would be required for those school talks which would be sure to inspire an interest in the study and culture of trees, and in the broader subject of rural art and adornment. To all of the teachers of Connecticut inclined to give such instruction in their schools my "Economic Tree Planting" will be sent without charge, at least so long as the thousand copies printed for that purpose may last.

The planting of the Syrian Willow, the supply of which fell far short of the demand, was designed as a *mere beginning*, sure to lead to something more and better, and to interest our teachers and youth in the broad subject of tree-planting. Beautiful as is the weeping willow, I was careful to say "I should greatly prefer to start five thousand elms or maples if it could be done as easily as my five thousand willows seem likely to be stuck in the ground." While regretting that so many applicants should be disappointed, I urge those who failed to get the willow (and I expect the same of all who succeeded), to try the far better plan of planting our common but very beautiful white ash or elm, maple, white oak, tulip, American linden—or the Scotch fir and European larch. I advise our boys also to raise these

trees from the seed which may be easily gathered every autumn.

The Schools of Forestry have exerted a remarkable influence in Germany in diffusing among the people a general and genuine interest in arboriculture. They regard forests as their friends, and understand their climatic influence and economic value in staying spring torrents, preventing summer droughts and supplying lumber and fuel. The Germans have a passion for nature, and love to frequent their beautiful groves and gardens, for parks and woods abound in or near their cities and towns. The rural and suburban adornment, now the pride and glory of so many beautiful towns in Germany, and the fruit of this revived love of arboriculture, is largely due to the influence and the literature which has emanated from her Schools of Forestry. Hence the wanton forest fires so common and destructive in America are comparatively unknown in Germany. The forest incendiary would be regarded as a common enemy, like the poisoner of an acqueduct, recklessly destroying that which it is the interest of all to preserve. The Forest Schools have created a healthful public sentiment which constitutes the best possible protection of the woods.

Efforts are now making to organize a Department of Forestry in connection with the University and new Arboretum of Edinburgh. Hitherto Forestry has been little taught in England, and her young foresters have therefore been educated on the Continent. There is a growing conviction of the need of such institutions in England, due largely to the able and persistent exertions of Rev. J. C. Brown, LL.D., to whom I am indebted for many statements given in this paper. The London Journal of Forestry says: "The University of Edinburgh posesses remarkable facilities for the creation of a School of Forestry, which with some slight additions could be easily converted into a thoroughly equipped Forest Department, capable of teaching the science of Forestry in the most complete and efficient manner.* Such an Institution is one of the greatest wants of the age in this country, and no country in the world requires it more. With India, Canada, Australia, New Zealand and South Africa, not to mention numerous smaller dependencies of the British Empire,

* This language is equally applicable to the Sheffield Scientific School and to several scientific schools in other States.

crying out to us to furnish them with thoroughly educated foresters, to conserve and restore their fast disappearing forests, or to create new ones, it is a standing blot on the institutions of our country that we cannot educate and qualify at home the men who are needed for this important service. Such an institution would be of inestimable value to India and all our colonies, and exert a most beneficent influence on the management and productiveness of our home forests and the rural prosperity of the whole country. The forest wealth of Canada is being rapidly exhausted. The great pine forests on the Ottawa, St. Maurice and Saguenay rivers, with their wonderful net work of tributary streams, are rapidly disappearing beneath the ruthless ax of the lumberman. All the more accessible parts of these great forests are already cleared of pine timber. That huge tract of forest between the Ottawa and the St. Maurice, which once seemed inexhaustible, is fast disappearing beneath the destroying ax."

Dr. Hooker, Director of the Royal Gardens at Kew, says: "Forestry, a subject so utterly neglected in this country, that we are forced to send all candidates for forest appointments to France or Germany for instruction both in theory and practice, holds on the Continent an honorable, and even a distinguished place, among the branches of a liberal education. In the estimation of the average Briton, forests are of infinitely less importance than the game they shelter, and not long since the wanton destruction of a fine young tree was considered a venial offence compared with snaring a pheasant or rabbit. Wherever the English rule extends, with the single exception of India, the same apathy prevails. In South Africa, millions of acres have been made *desert*, and more are being made desert annually, through the destruction of the indigenous forests; in Demerara the useful timber trees have all been removed from accessible regions, and no thought is given to planting others; from Trinidad we have the same story; in New Zealand there is not now a good Kauri pine to be found near the coast, and the annals of almost every English colony repeat the tale of willful, wanton waste and improvidence. On the other hand, in France, Prussia, Switzerland, Austria, Italy and Russia, the forests and waste lands are the subjects of devoted

attention on the part of the government, and colleges provided with a complete staff of accomplished professors train youths of good birth and education to the duties of State foresters. Nor, in the case of France, is this law confined to the mother country; the Algerian forests are worked with scrupulous solicitude, and the collection of vegetable produce from the French Colonies in the Museum at Paris, show that their forest products are all diligently explored." The above criticism of the neglect and inaction of England applies equally to America.

One of the oldest and best schools of forestry in Europe is at Nancy, a beautiful city of great historic interest, pleasantly located on the left bank of the Meurthe, and at the base of a long range of wooded and vine-clad hills, about two hundred miles east of Paris. The parks and gardens of the city are finely adorned with trees and shrubbery. The Department of Meurthe, of which it is the capital, owes much of its rare rural beauty to the influence of this celebrated school. Forestry began to be studied as a science in France during the last century, though these investigations were long interrupted by the French revolution and the consequent wars. On the re-establishment of peace this study was resumed, and the School of Forestry was organized at Nancy, which, enlarged and more fully equipped, is now liberally supported. The cabinets, museums, apparatus and appliances of every sort, seemed to me most complete and ample, although the Director informed me that their choicest material was already packed for the Paris Exposition. Instruction is given gratuitously to those who prepare for the State Forest Service, and the importance of this service may be inferred from the fact that the State forests cover an area of nearly three millions of acres, or about the size of Connecticut, with a gross revenue of about seven millions of dollars, or deducting all expenses, a net revenue of over five millions of dollars. The total expense for board, lodging, uniform, instruments and pocket money, is from four to five hundred dollars a year. To "foreign students" a moderate charge is added for tuition. I found a considerable number of English students in attendance here last summer, who are candidates for forest service in India.

The course occupies three years. The daily work requires ten

hours, and fifteen hundred hours must be given to study, each half year. In the Winter Session, from November 1st to May 1st, seventy-five lectures of an hour and a half each are given on forest economy, and the same amount of time is allotted for preparation of the special topic of each lecture, embracing in the course, the exploitation of forests; relation of forests to climate; natural history of different kinds of trees; management of forests; conversion of one form of forest into another; and desirable qualities and defects of woods. The same number of lectures and the same amount of study are devoted to botany—the structure, organs, physiology and geographical distribution of plants. Of the seventy-five lectures devoted to mathematics, twenty are taken up with land-surveying and levelling, fifteen hours are given to the preparation of plans under the direction of a professor, twenty-two hours to elevations in water-colors, the same time to sketches and descriptions of rising grounds and to diagrams and calculations of polygonal figures, and also to elevations and designs in hatchwork. There are also lectures and lessons in road and bridge building, such as may be required in the exploitation of forests; in forest law and in the German language, together with some military instruction and drill, and practice in horsemanship.

In the Summer Session, from May to September, thirty-one days are spent in botanical and professional excursions in the Vosges, the Jura and other mountains, in which are visited forests in all stages of treatment and exploitation, and where the students are required to practice in the mensuration of wood and timber. Six days are allotted to preparing a report of the tour of observation and an herbarium of the plants collected. Seven days in the field and fifteen hours in the study are given to making a diagram with report, full calculations and topographical plan, including levels and a reduced drawing of the same, and one day in each section of the forest visited to a mensuration of a supposed felling and the preparation of an official report of it. Five days of work on the ground are given to the study of an imaginary projected road, and twenty days to making drawings and specifications and estimates relating to embankments, consolidating the scarps of ravines, building barriers of masonry or fascines across the bed of

streams, and cutting terraces along the scarps. Six days are spent in military reconnaissance with reports and sketches, and in competitive rifle-shooting. The examinations occupy twenty-one days, and eighteen are spent as holydays.

In the second year substantially the same topics of an advancing grade are pursued with an equally full course of study and lectures. The season for cutting timber, the ages of different kinds of trees to be felled, the proper time for a revolution or forest crop and its restoration; mineralogy, lithology and the geological features of France; saw-mills and everything relating thereto, are among the additional studies of the third term. In the summer session, twenty-three days are spent in the forests of Meurthe-et-Moselle and of the l'Aine, in the study of the management of fellings formed of mixed timber, and of coppice being converted into timber forest, and fourteen days are allotted to the preparation of reports of these observations. Two days are devoted to land surveying and six to trigonometrical surveys, making a trigonometrical survey of a forest in the environs of Nancy or of the Vosges, reconnoitering the ground, planting signals, measuring a base line and observing the angles. Twelve days are assigned to the preparation of diagrams and calculations of the net-work of angles and a connection of this net-work with the lines on the map of France. Eleven days are given to the study of the saw-mills in the Vosges, five days of work on the ground and six in the class-room are given to preparing a sketch and a description of diagrams of the mechanism of five saw-mills selected as the best specimens found in operation; to experiments in the gauging of water-courses, the effect of water-wheels, and the time required in the work of sawing, and to the general coefficient of waste.

The Winter Session of the third year extends over the five months from November to April, and is designed for advanced students. In addition to some branches already enumerated, zoölogy with especial attention to entomology, the ravages committed by insects upon forests, the means of averting or destroying them and of recovering a forest ravaged by them; the fixation of sand dunes, the reclamation of barren wastes, and the re-foresting of denuded mountains; the geology and

mineralogy of the mountains of France, mountain torrents, their causes and the means of preventing them, the plans of work projected and the works accomplished; the chemistry of vegetation and all that relates to the production and assimilation of atmospherical and terrestrial elements. The Summer Session of the third year continuing five months from the first of April, is largely occupied with field-work and observations, especially in the study of the oak forests of Central France, the coniferous forests of the Vosges and Jura and the reforested regions of the Alps. During the entire course the field excursions are made under the direction of competent professors, and careful memoirs of these journeys and observations with sketches, plans and diagrams are always required.

Italy has experienced the disastrous effects of forest denudation, in climatic excesses, in spring torrents and summer droughts, or at least, in the great diminution of the summer streams and rivers—the sources of irrigation. A code of forest laws has lately been passed, for the extension and protection of the national forests, and for the replanting of communal and private woods. The scientific training of professional foresters is found needful to repair the great waste and damage done in previous centuries. The officers charged with the administration of these forest laws are mainly graduates of the Royal Instituto Forestale at Vallombrosa. While in Switzerland, a letter from our minister at Rome, Hon. George P. Marsh (who had been informed of my errand in Europe), strongly advised me to visit Vallombrosa, and a letter from Mr. Marsh to the Director General, Adolfo di Bérenger, secured every facility for observation and information when I did visit that institution. Founded as an abbey by Pope Alexander II. in 1070, it early became one of the most celebrated monasteries of Italy, if not of the world, remarkable for its romantic situation (vallis umbrosa, or shady valley of the Appenines, nearly six thousand feet above the sea), its great wealth, the extent of its lands and of its grand planted forests. The present magnificent buildings were erected about two hundred and fifty years ago (1637). For centuries this place has been visited by distinguished travelers. Dante delighted to ramble among these magnificent scenes. Mrs. Browning says of Milton:

"He sang of paradise and smiled,
Remembering Vallombrosa."

When penetrating these dense forests and clambering up the steep ascents to the valley summit, I felt the fitness of his familiar words, and familiar they deserve to be with all our youth.

"Thick as autumnal leaves that strew the brooks,
In Vallombrosa, where the Etrurian shades
High over arched, embower.
. . . . And overhead up grew,
Insuperable height of loftiest shade,
Cedar, and pine, and fir and branching palm,
A sylvan scene; and as the ranks ascend
Shade above shade, a woody theater of stateliest view."

An hour's ride from Florence by the Arezzo Railway brings one to Pontassieve. Thence a drive of some eight miles by a series of zigzags and through avenues of cypress and mulberry trees, leads to the terminus of the carriage road. Grand and extensive views of the beautiful valley of the Arno (Val d' Arno), open at every turn, with fine vineyards, orchards and highly cultivated fields, here and there protected by long dykes from the river floods which forest denudations on the tributaries of the Arno have occasioned. From the road a foot and mule path of three miles up a steep ascent leads to the ancient monastery. Here were workmen cutting spars for ship building, to be floated down the Arno to Pisa, or into the Mediterranean. These Benedictine monks centuries ago understood well the economic value of tree planting. It is due to their sagacity and foresight that these vast lands are now densely covered with various pines, firs, beech and chestnut. The very position of the trees, standing in exact rows, shows that tree planting on a large scale has here been successfully carried on for centuries. The silver firs, planted around the abbey centuries ago, are now magnificent and stately trees.

The following sketch of this Forest School is condensed from a fuller history given me by Director Bérenger. This monastery was appropriated by the State in 1865, and opened as a Forest School in 1867, though its organization was not completed till nearly two years later. As the snow lies deep for three months on these mountain heights, the school is transferred for four

months, from November to March, to the old castle of the Counts Guidi at Paterno near the base of the mountain, and only twelve hundred feet above the sea. During the remaining eight months the head-quarters are at the high elevation of Vallombrosa. The contrast in the elevations of the two locations favors the maintenance of two distinct arboretums, the one at Paterno showing the vegetation of Southern Italy, and even the tender exotics of the tropics, while on the heights of Vallombrosa are planted the trees of Northern Europe and America as well as of the Alps. Great varieties of pines, firs, larch, ash, chestnut, oak, beech are cultivated in the nuseries for planting on the slopes and heights of the Appenines. The Director expressed special interest in the culture of the Fraxinus Americana—our white ash. The students each have their small nursery lots in which they try their hands in planting and trans-planting various trees, thus uniting theory and practice.

The Institution has its director and five professors, a library containing nearly 2,500 volumes of forest literature; a well furnished chemical laboratory; a meteorological observatory, where the indications of the thermometer, barometer, pluviometer, anemometer, hygrometer and seismometer are regularly recorded; instruments for tree-measuring and surveying and various arboricultural instruments, models of timber slides; timber carts; sections of wood, indigenous and exotic, and objects of natural history relating to forestry. The professors are appointed by the King, on the recommendation of the Minister of Agriculture. The number of pupils admissible is sixty. Besides the common rudiments, candidates for admission must pass an examination in history, natural history, algebra, geometry, physics and chemistry. The students wear the neat uniform of the Institution, which is that of a forest guard, with oak twigs of gold lace on the collar and cap. The discipline is mildly military, the students respond to the call of the trumpet instead of a college bell, cannot leave the precincts without permission, and are liable to confinement for insubordination. The students make frequent and sometimes extensive excursions through the national and communal forests, with the Professor of Natural History, to observe and collect specimens; with the Professor of Mathematics and Surveying, to make plans

and elevations of the surrounding lands, measure the height and girth of trees, calculate the amount of timber, and learn the various methods of management and exploitation of forests, and with Director Bérenger for special exercises in practical forestry. Besides regular lesson trips, a long excursion is made annually to some extensive woods. One of these journeys of observation, occupying a month, extended to Naples during the International Exhibition of Woods used in Ship building, and included the inspection of the leading forests in Southern Italy.

The following is the Curriculum:

FIRST YEAR. *Mathematics*, including Algebra, Geometry and Trigonometry. *Chemistry*—Organic and Inorganic, with experiments. *Natural History*—Botany, Systematic and Vegetable Physiology. *Forestry*—Theoretic and Practical. *Languages*—Italian, German and French, with Reading, Writing and translating of Forest Literature.

SECOND YEAR. *Mathematics applied*—Differential and Integral Calculus, Conic Sections, Measuring Heights of Trees and Cubic Contents, Plan Drawing and Valuation Surveys. *Climatology* and Forest Meteorology. *Natural History*—Botany, Dendrology, Forest Entomology, Geology and Mineralogy. *Forest Economy*—History of Forest Science, Practical Sylviculture, Seasoning of Timber and Exploitation of Forests. *Elements of Agriculture*—Improvement of Soils, Pasturage, Drainage, Agriculture, etc. *Languages*—Exercises in Italian, German and French.

THIRD YEAR. *Mathematics applied*—Rates of Growth of Trees. Mensuration, Preparing Charts and Levels, Estimating Condition and Value of Forests, Forest Administration—Statistics of different Woods, Classification of Forests, Reclamation of Barrens and Wastes, Planting of Sand Dunes, and of Marshes. *Forest Land*—Government and Pastoral Rights. *Forest Economy*—Political and National. *Languages*—Italian, German and French.

The first year is mainly devoted to scientific training, and in the second and third years the practical details of forest management are taught. Tracts of land bearing evergreen and deciduous trees of various ages are set apart to be managed by individual students. In the nursery also, each has a division bearing his name where he may show his skill, patience and

fidelity in preparing the soil, sowing the seed, watering the plants, and trans-planting the young trees.

In Italy, Germany and France, the advice of the Government foresters is given gratuitously to all tree-planters, and the young trees are furnished from the nurseries connected with the Schools of Forestry at a nominal price far below the cost, in order to encourage tree-planting to the utmost. With all proprietors of forests, whether the State, the Commune, corporations or individuals, the Government enjoins first, what must be done in all cases, and secondly, sets forth what may be done, that is, what is desirable but optional. In certain localities, the owner must get the permission of the forester of his province before he may fell trees on his own grounds. If the interest of that province and of the country require the retention of trees on the mountain tops, the State compensates the owner of the land for any loss thus incurred, or the older and larger trees only are cut, and a continuous forest growth maintained. It is their theory that the forests belong not to one generation only but to all, and each is bound to leave them as good as it found them.

Schools of Forestry in Europe are of two kinds; first those designed exclusively for the study of forest science and its collateral branches, the *Forstakademie;* second the *Allgemeine Hochschule*, or the collegiate or polytechnic institution with a comprehensive course of study, of which forestry is one prominent department. Nancy and Vallombrosa are examples of Forest Schools, pure and simple. Carlsruhe and Hohenheim will illustrate the other class. "The Polytechnic" in Carlsruhe comprises six separate departments, viz: Mathematics, Engineering, Machinery, Architecture, Chemistry and Forestry, with a staff of forty-nine professors, lecturers, tutors and assistants. I was struck with the extent of the eleven "Collections" here provided to aid in instruction, including objects connected with forests; models connected with engineering, machinery and architecture, besides the usual botanic, mineral, and philosophic collections, and an arboretum or forest garden. Professor Meyer said that each of these departments really helps all the others, and the union plan proves the most economic and feasible, and that the two Professors of Forestry here by the aid of their associates accomplish results which require from five to seven professors in the isolated *Forstakademies.*

The Royal Wurtemburg Academy at Hohenheim is a School both of Agriculture and Forestry. Its immense edifice, formerly a summer palace of the Wurtemburg kings, is delightfully situated on very high ground nine miles from Stuttgart. Near the building is a fine park and experimental and botanic gardens, groves and an arboricultural nursery. The botanic garden covering over twelve acres contains some two thousand species and varieties of plants important in forest and naval economy, and an "exotic garden" of twenty acres specially adapted to forest botany. Near by upon the same mountain range is a forest district of about six thousand acres, embracing a variety of soil and of trees. The institution has an extensive collection of implements used in practical forestry, with models of machines and studies pertaining thereto; a museum of forest products, an herbarium containing over ten thousand species, and a very interesting collection of microscopic preparations more extensive than I had elsewhere seen, with a curious collection of pathological specimens, illustrative of diseased malformation and some seven thousand specimens of fruits and seeds. Great varieties of fine wood showing the texture and grain, are exhibited in the museums of all Forest Schools, but this is a remarkable collection of "microscopic specimens"—transverse sections of wood thin as the finest paper arranged in books as photographs are set in the spaces of an album. Held up to the light, these thin sections are translucent, almost transparent, and show the most delicate shades in the grain of the wood. Here is also a collection of noxious insects and all animals harmful to trees. The insects are shown in all their progressive states as eggs, larvæ, pupa or chrysalis, caterpillar and moth, with their nests, and perforations in the stems or branches, and with samples of the trunk, bark, branch, root, leaf, cone or fruit, both sound and injured. For a careful comparison, the healthy and diseased specimens are placed side by side.

The curriculum fills two years, and in the forest department embraces among others the following topics: Forest Economy; History and Literature of Forest Economy; Forest Products, including Forest Botany, Sylviculture, Forest protection, Technical properties of timber, Uses of forests and forest technology; Forest administration including mensuration of trees and forests,

partition of forests for exploitation, valuation of forests and practical management of forests, forest excursions, "demonstrations" in different forest districts, Botanic Garden and Museum of Forest Products, cubic measurements of trees and cubic contents of woods, land surveying and levelling and mensuration of forests with theodolite.

For lodging and tuition the students, if subjects of Wurtemburg, pay less than forty dollars a year, but foreign students are charged threefold more. Foreigners are admitted who pass the required examination and produce the "ticket of legitimation" from the proper authorities. Dom Pedro appreciates the national importance of forestry in Brazil. I was much interested in an intelligent and ambitious young Brazilian who is here training himself for a forest appointment in his native country.

A striking illustration of the influence of Forest Schools is found in the authorship of their professors and graduates. In the long run, the influence of any institution may be measured largely by the authorship which it prompts. Judged by this test, the Forest Schools of Europe have made a worthy record. By the coöperation of their professors and other writers, and sometimes of government officials especially commissioned to investigate different branches of the subject, the literature of forestry, already large, is now rapidly increasing. A German catalogue gives the titles of 1,815 volumes on forestry issued prior to 1842, and the titles of 650 works published in the six years prior to 1876. On an average, over one hundred new books on forestry appear annually in the German language. One of the Spanish Commissioners to the Centennial Exposition, Señor Morera, published a list of 1,126 volumes on forestry in the Spanish language alone. Director Bérenger of Vallombrosa has published over thirty books and pamphlets, among them one pronounced by Hon. George P. Marsh of great value on "The Absolute Influence of Forests on the Temperature of the Air." He also edits an able Journal of Forestry, "The Giornale di Economia Forestale."

The question has been much mooted in Europe of late, whether Schools of Forestry should be isolated, or connected as an additional department with existing universities or Poly-

technic or other institutions of a more comprehensive character. This was the leading topic of discussion at the last Congress of Foresters which was held at Freiburg in Baden, and attended by nearly four hundred members, representing all parts of Germany, also Switzerland, Austria and Russia. The leading German writers on forestry and the most prominent government officials in the management of the Crown and Communal forests were there. The President of the Convention was Dr. Nordlinger, the eminent Professor of Forestry at Hohenheim. The discussion, which was virtually a continuation of the debate begun at the Convention in Mülhausen the year before, awakened great interest and occupied six hours, the sederunt commencing at 8 A. M. and continuing, with an hour's intermission, till 3 P. M.

A brief summary of the leading arguments shows the feasibility of connecting a Department of Forestry with the Sheffield Scientific School. The discussion was opened by Professor Danckelmann, Director of the School of Forestry at Newstadt-Eberswalde in Prussia, defending the separate *Forstakademie*. He contended that Universities are designed to aid thorough investigations in the abstract rather than in the concrete. Though rich fountains of knowledge, they do not teach practical skill. The Forest Academies on the other hand keep the practical ever in view, and the attainment of knowledge is always combined with practice. Four things are essential; first, instruction in the technical work of forestry; next, in the management of forests; thirdly, in scientific research; and lastly, in the practical application of theories. Special schools are best fitted to secure these results. The *Hochschulen* are located far away from any forest, and the professors therefore are less acquainted with practical forestry, and the students, though more varied in their attainments, will fail to know thoroughly the things most essential for their profession; they will remain strangers to forests, and will not learn how to question trees; they may see cases of dead insects and yet learn nothing of the lives and habits of insects. To be a means of instruction, the forest must be a demonstration ground, and should be so situated that it can be visited daily without fatigue or expense. Though the University is the center of

culture and aristocracy, each of these is of secondary importance in the training in forest technology. The professors of the accessory sciences are out of sympathy with the forest, and busy themselves with problems irrespective of their relation to forest science. If it be said that the Universities have produced more eminent writers and thinkers than the forest academy, the remedy should be found in the academy and in the enlargement of its course of study, with opportunity for the student to resort to the forest every day, proposing and solving his questions on vegetable physiology and zoölogy.

The speaker appointed to open the discussion on the other side, Dr. von Seckendorff from Vienna, attributed the origin of isolated schools of forestry to the former state of forests, and the limited education required for forest service in a by-gone day. But now a more scientific method of research in forest matters has been introduced, and a higher testing examination is demanded of students in forest science. A liberal education is essential here as well as in the other professions. The advocates of separate forest schools claim two points of especial superiority; first, that their students are better trained in practical forestry, and second, that in these only are the studies conducted with due reference to the requirements of the forester. They assume that in the vicinity of the Allgemeine Hochschulen there are no forests suitable for the instruction of students, and that a purely theoretical education only must here prevail. These assumptions are unfounded.

The number of University and *Hochschule* towns in Germany, richly surrounded by woods is very great. In a line drawn from the coast of the German Ocean to the place of this meeting alone, there are Hanover, Göttingen, Marburg, Giessen, Heidelberg, Carlsruhe and Freiburg, all so surrounded. It is not the extent of a forest which decides its suitability as a means of instruction, so much as its variety of trees and modes of treatment and exploitation.

The second assumption will not bear examination. Science and practical work are not antagonistic to each other. In the Universities instruction does not go beyond what is desirable for every educated man. And there ought to be no ground for the suspicion that any students of forestry choose that depart-

ment because it makes the least demand upon them. Situated near railways, the Universities have the best facilities for forestral excursions and for fullest demonstrations in the field. As a matter of fact, the special schools do not turn out more practical men, and are not supplied with better districts for excursions, while on the other hand, in the *Allgemeine Hochschulen*, the instruction in the accessory sciences can be more complete and extended, and be given at no additional expense to the State.

After a long and spirited discussion by prominent professors from both classes of Forest Schools, the President, Dr. Nordlinger, desired those who were in favor of combining instruction in forestry with other departments in the university or *Allgemeine Hochschulen* to rise, when seemingly the whole assembly rose, which was followed by vehement applause. When those who favored the separate system were invited to rise, only sixteen members stood up. It will thus be seen that the result of the fullest and latest experience of Europe is in favor of organizing a forest department in connection with some existing collegiate institution.

INDUSTRIAL SCHOOLS.

No feature of the Educational Systems of Germany, Switzerland, Austria, Belgium, France and other European countries is more striking to an American observer, than the large number of Industrial Schools, specially designed to train apprentices and make skilled workmen and competent foremen. These schools are very numerous, and as various as the kinds of industry pursued in each country or province. There has been the greatest progress in manufactures in those countries where these schools have been maintained longest and most liberally. Geneva has for many years maintained a Horological School, and the Swiss watches have long been celebrated throughout the world. Last summer I visited the new Horological Institute then building in Geneva, a magnificent edifice to cost over $200,000, and also witnessed the work of the school then in its old quarters. The course of study and practice covers three years. There were seven instructors, who are experts both in the theory and practice. No one can graduate till he has proved his skill, again and again, by making an entire watch of standard excellence. The patient training of these classes, or rather of each individual member, in the minutest particulars, both in theory and practice, and the criticism of defects in the work done, illustrate the attention given to details in all Industrial Schools.

The same attention to minute details is seen in the Industrial School at Lyons, France, to which the preëminence of that city in the manufacture of silk is largely due. It has twelve professors, and the course of study occupies three years. Here, as in all Industrial Schools, a prominent study is drawing, drawing ornaments, tinted drawings, and sketching plans of machines from memory. Thorough instruction is given in every detail relating to the manufacture of textile fabrics, especially of silks, the natural history of silk, treatment of the silk worm and cocoons, spinning, throwing, weaving and testing of silks; sorting and cleaning; winding, warping and beaming; changing of looms for weaving different styles; defects in operations and their remedies; decomposition of tissues;

chemistry, especially as applied to dyeing and printing; physics with its applications to heating, steam-boilers, drying and ventilation; mechanics, embracing prime motors, materials and construction; hygiene, including physiology, noxious and useful animals, dangerous and unhealthy occupations, contagious diseases and how to avoid taking them; rural economy and "industrial plants." Manual exercises are conducted in the workshops in making, mending, putting up and shipping looms, in turning, filing, forging, fitting and various joiner's and machinist work. Frequent visits are made to the various factories in Lyons, under the lead of an instructor, where every part and process is fully explained. The students afterwards draw from memory plans of patterns and of machines.

About one hundred pupils on an average are in attendance. The regular charge for tuition, use of laboratories and workshops, is $140 a year. Indigent students are aided by the Chamber of Commerce and Municipal Council of Lyons, so that a portion only pay the full tuition. That this school, conducted without aid from the government of France, should be so liberally supported by the citizens of Lyons, and continue to flourish for so long a period, is ample evidence of its great usefulness in the opinion of the most competent judges.

More than sixty years ago France started special schools in the arts of designing, engraving and dyeing; in silk and ribbon weaving and lace making; in carving, stone-cutting and diamond-cutting (hence the diamond-cutting for the world is still carried on mainly in Paris); in porcelain and various ceramic productions, and the preëminence thus gained is still retained. The artistic manufactures of France command the markets of the world. The Industrial Schools more recently organized in Germany, Switzerland, Belgium, Austria, Italy and England, which in the aggregate are numbered by thousands, make these nations formidable competitors in artistic work.

When invited by the Minister of Public Instruction of France to visit the National Porcelain Factory at Sèvres, I expressed to him surprise that such an establishment should come under the supervision of the Educational Department, to which he replied, "It is because it is the duty of this department to supervise and control the Preparatory School for Sèvres, which

you should first visit." On inspecting this School of Design in Paris, I found in the lower rooms the methods and work of a first-class drawing school. But in the upper rooms the classes were painting on elegant goblets, cups, plates, vases and other choicer wares, just brought from Sèvres and to be returned there for baking. After witnessing this truly artistic work, I no longer wondered that in the Sèvres factory itself the artisan had indeed become the artist, and that only men of princely wealth could procure the products of this unrivalled establishment.

In Belgium the girls have shared the advantages of Industrial Schools as well as the boys. The schools for training in lace-making and embroidering, in Brussels, have long been celebrated, and kindred schools have more recently been opened in Rowlers, Ghent, Ath, Deerlyk and in many other places in that busy little kingdom. To those familiar with this fact, it was no surprise that Belgian lace shown at the Philadelphia Exposition was unrivalled. Some Industrial Schools are maintained wholly by the central government, others partially, and still others are supported by endowments, and many are private institutions dependent mostly on tuition for support. A large number called apprentice schools are maintained by benevolent associations. These are designed to train boys and girls both in skilled manipulations in various trades, and in the practical studies and theories most helpful in such pursuits.

Belgium, with about fifty industrial schools, and fifteen thousand apprentices graduated from them, Germany with over fifty-two thousand apprentices in fourteen hundred and fifty industrial schools, and France with twelve thousand industrial scholars, show the practical appreciation of these institutions in these countries, which distance the competition of surrounding nations in the great markets of the world. Steam and the telegraph are bringing all nations into such near neighborhood that industrial ascendancy will belong to that country which provides the best industrial education.

The Artisan School established nine years ago in Rotterdam, Holland, has already two hundred pupils and commands the confidence of that community. Candidates for admission must pass an examination in the simpler rudiments, and are expected

to remain in the school three years. The institution is both a school and a shop, and the time of the pupils is daily divided between the two. Drawing, Physics and Elementary Mechanics are prominent among the practical studies of the school room. In the shops a great variety of trades are taught, such as stone-cutting, including keystones, steps, thresholds, flooring tiles and placing plinths; masonry, including plain walls, foundations, chimneys, niches, sewers, arches, &c.; smithery, or making cramps, hooks, hinges, nuts, locks, girders, &c. The braziers are taught forging, turning, stretching and soldering, and make water-cans, dust-pans, kettles, basins, springs and various kitchen utensils. The instrument-makers learn to cut screws and worms, forge steel and copper and cast copper objects. The carpenters make chests, desks, trestles, windows, doors and the like. The painters learn to make putty, grind paint, polish wood, set glass, paint letters and to grain in imitation of marble or the choicer woods. In the Philadelphia Exposition the admirable exhibit of the various articles made by these boys proved alike their skill and the practical value of this institution.

In view of the great variety of the work and the need of individual instruction, twenty-one masters are employed in this school. Great prominence is given to drawing, as lying at the foundation of skilled industry. The Director is the teacher of construction and projective drawing. There are four other teachers of drawing—rectilinear, architectural, ornamental and model drawing, and one or more in each of the other departments above named. The boys draw simple constructions from wood, iron or brick work, such as window joints, doors, jambs, ravelins, stair-cases, roof-constructions, brace-works, springs, locks, cornices, architraves, &c. The school studies occupy each morning and the practical instruction in the workshops the afternoon. As soon as the boys are made familiar with the tools, they are entrusted with practical and marketable work, not sham or play-work, but the making of saleable articles for the trade, so that they at once feel that they are engaged in real business. This plan excites the ambition of the boys and adds interest and dignity to their work. The workshops are of the most approved kind and are supplied with the best tools and appliances. In the carpenter's shop, there are benches

with their appliances for eighty boys; and in the smithies are all needed forges, anvils, vices, benches, &c., for seventy boys. The directors, on whose authority the above statements are given, say, that on successfully completing their three years course, these boys receive considerably higher pay than those who have not enjoyed the advantages of the school.

Needle work forms a part of the course of instruction for girls in a large part of the elementary schools of Europe. In Switzerland four thousand three hundred and seventy-three females are employed in schools teaching needle work. In some schools I saw these teachers training their scholars in the use of the American sewing machine.

When one has inspected her technical schools and her twenty-nine industrial schools, he is no longer surprised that Switzerland is especially the home of industry, for her mechanics are educated and skillful. Though hemmed in by mountains, without a seaport, with few minerals and no coal, with costly transportation, all freight from the sea board coming over foreign territory, she threatens the ribbon trade of Coventry, rivals the English in muslin and delaine, and the world in watches and wood-carving. More than one million watches are made annually in Geneva and Neuchatel alone. The Swiss are an ingenious and industrious people. They believe in the dignity of labor and in the thorough mastery of some trade. In their industrial schools, prominence is given to drawing, designing and moulding, as well as to practice in the trades. Hence the world pays substantial tribute to Switzerland for the exquisite taste displayed in the decorative arts, their unequaled carvings, their beautiful chasings in gold and silver, their silk ribbons, their watches and music boxes.

The Earl of Rosebury says that the cause of this rapid progress of Swiss manufacture is plainly "the complete and *special* education which she gives in primary schools and *practical* schools, and *trade* schools, and secondary schools, and cantonal schools, all topped up by the great Polytechnic Institute at Zurich. The Swiss manufacturer is master of his business, and his workmen with whom he is in perpetual contact, respect him for this. Master and servant have been at the *same school learning their craft*, and they know it thoroughly."

Public schools, industrial schools and the Polytechnic Institute have in a remarkable manner unified and fraternized the people of these twenty-five cantons. Though separate in race, religion and language, they are one in national sympathy and interest, proud of their history, and prouder still of their recent progress and manufacturing prosperity. While beggars are found everywhere in Europe, there is less pauperism in Switzerland than in any other nation on the continent. With no communism, there is still a general diffusion of property, and almost every one is a land-owner.

In our country by reason of the restrictions imposed by our Trades Unions, apprenticeships are so much lessened that it is now difficult for boys to learn a trade. Hence increasing numbers are growing up to manhood in idleness, without any regular calling, or seeking to earn a livelihood without manual labor. This limitation of apprenticeships is a short-sighted and suicidal plan, sure to cripple our future mechanics. It seeks a temporary gain at the sacrifice of a permanent prosperity, and is depriving many boys of that thorough training in the several trades which is essential to their skill and success. The system of apprenticeship ought to be encouraged as an indispensable part of the practical education of our future artizans. Otherwise our youth must surrender the most lucrative positions to skilled mechanics imported from abroad. This waning of apprenticeships, which cannot easily be remedied, creates the greater necessity for industrial education.

In speaking of the substitution of steam power for hand labor, J. Scott Russell says: "Occupations which require no skill, but only brute force, will necessarily be vacated by human hands. Society, in the march of improvement, is as certain to do without the unskilled, unintelligent and uneducated as it is to do without wild plants and animals." Certainly any system of public instruction which leaves industrial education out of the account is radically defective. Fortunately this was the theory and practice of the early settlers of Connecticut. The founders of this State valued and honored industry. The code of 1650 which stood in this respect unchanged for over one hundred and fifty years required, "That all parents and masters do breed and bring up their children and apprentices in

some honest lawful calling, labor or employment, either in husbandry or some other trade, profitable to themselves and the Commonwealth, if they will not or cannot train them up in learning to fit them for higher employments." In 1683, Penn proposed the following resolution which was adopted by the Provincial Council, "That all children within this province of the age of twelve years shall be taught some useful trade or skill, to the end that none may be idle, but that the poor may work to live, and the rich, if they become poor, may not want." How different would have been the history of Virginia and South Carolina, with their sunny climate and greater natural resources, had the founders of those States preached and practiced these sentiments which have been the source of the thrift, growth and prosperity of the North. Elizabeth Thompson well says: "Honest labor is the need of the hour, alike demanded by the physical, mental, moral and financial condition of the nation. Industrial education alone can bring about this reformation by joining with labor skill, dignity and honor." Industrial schools are now more needed than new colleges. "The danger is not of over education, with earnest aims and in the right channels, but of a genteel and lazy dilettanteism."

I have discussed this subject partly in order to invite the attention of wealthy men to its importance, and ultimately secure liberal endowments for industrial education. The extract from the will of David Watkinson, given below, and the liberal offer of one hundred thousand dollars by Hon. T. M. Allyn for the support of an industrial school in Hartford, show that this need has long been felt. If the Loomis Institute with its large endowment shall be devoted to the purpose of industrial education, it will meet a great and growing want, which no existing institution in the State attempts to supply. If the liberal offer of Mr. Allyn should be continued and accepted, it would be a nucleus around which other gifts would gather till the school should prove a great benefaction to the State. Such, at least, was the result of the donation of Mr. Boynton in Massachusetts.

The Worcester Free Institute was started by the gift of $127,000 by John Boynton. This beginning led Ichabod Washburne to consider the pressing demand for industrial

training, and he gave $130,000 to enlarge the resources of the Institute. Further endowments were made by Stephen Salisbury of $250,000, and by the State of Massachusetts of $50,000 giving a total endowment of $557,000. If the surviving members of the Loomis family carry out their present plan, the "Loomis Institute" will have double this endowment. Without even the semblance of dictation in the plans which they alone have the right to form, and with a grateful appreciation of the beneficent spirit they evince, I most respectfully suggest to them, and to other wealthy men who desire to become benefactors of the State, this means of meeting a great public need and erecting a lasting monument to their memory.

The following is the plan of the proposed gift of Mr. Allyn to the city of Hartford, some five years ago.

To the Mayor, Aldermen and Common Council of the City of Hartford:

The undersigned hereby offers to give to the City of Hartford the sum of *one hundred thousand dollars*, to be expended in the establishment and erection of an industrial school (under such rules and regulations as the authorities of the city may from time to time make), for the free education of both boys and girls in the business avocations of life, agriculture and the mechanic arts. The school should be a model, fashioned after our best ideal. It should possess ample grounds for an agricultural department, botanical gardens, and workshops where all the principal trades may be learned. Every boy, at the same time he is acquiring a knowledge of the arts, sciences and modern languages, should become a practical agriculturist or master some useful trade. The girls should be instructed in all the practical duties of the household, become familiar with the chemistry of the kitchen, and made to master the art of making any article of a lady's wardrobe, and also they may learn bookkeeping, banking, telegraphy, photography or any other occupation that is within the measure of their strength and adapted to their tastes. In this manner the education of the student would become a healthful exercise and a most fascinating amusement, instead of being (like the present system) destructive to vitality, exhaust-

ing the brain, and converting the school-room into an unattractive place little better than a prison.

It is believed that the amount proposed to be given will be sufficient for the purchase of the ground, erect suitable buildings and supply all the tools and apparatus required for the carrying out of the enterprise. The annual expense incurred of running the institution, after deducting the amount it would be entitled to receive from the school fund, should be cheerfully borne by the city. Should the proposition be entertained and the city accept the gift, it may be necessary to execute articles of agreement to secure the faithful performance of the trust assumed by the city.

T. M. ALLYN.

EXTRACT FROM THE WILL OF DAVID WATKINSON, WHO DIED AT HARTFORD, CONN., DEC. 13, 1857.

Codicil No. 11.

Article V. "Desiring to render a public benefit to the community in which I live, and to the State of Connecticut generally, by aiding in the establishment in the town of Hartford of a Juvenile Asylum and Farm School, for the family and school and industrial training of a class of children not now adequately provided for in any educational or humane institution: I do give and bequeath to my Executors the lot of land of about ten acres, surrounded by four streets, known as the Pavilion property, with the buildings standing thereon, and by me estimated to be worth the sum of $40,000 and in addition to said lot the sum of $20,000, said lot to be conveyed in fee simple, and said money to be paid over to Henry Barnard 2d, Edmond G. Howe, William L. Collins, William N. Matson, Henry Clay Trumbull, Daniel C. Gilman, Roland Mather, Newton Case, Alfred Watkinson, John S. Butler, Henry A. Perkins, Albert W. Butler, Edward Goodwin, E. A. Bulkeley, William D. Shipman and Austin Dunham, or such of them as may be living at the time of my decease, as Trustees for the purposes and uses herein set forth, viz:—to aid in the establishment and support of an institution for the relief, protection, instruction, reformation and employment of children between the ages of

six and twenty-one years who may be voluntarily entrusted to it for any or all of these purposes by the parent or guardians, or committed to its charge by competent authority.

Article VII. The institution designed to be established and aided by this bequest, is to be organized and conducted on the general principles and methods recognized in the Rauhen House near Hamburg in Germany, and the Agricultural Colony at Mettray in France, as described in Barnard's *National Education in Europe* (Edition of 1854), and in the Boston Asylum and Farm School, incorporated in its present form in 1833, and the New York Juvenile Asylum, incorporated in 1851, with such modifications as may be by the Trustees deemed to be better adapted to the peculiar condition of the people of this State, or which may be suggested by their own experience or that of similar institutions."

The amount of the Watkinson Fund is now $207,000. Of this sum $162,000 is invested in productive funds and $45,000 in land. The last sentence of the will gives the Trustees authority to make such modifications as they may deem needful for the industrial training of the inmates of the School. If industrial education becomes a prominent feature of the Institution, it will, in the words of the will, be "better adapted to the peculiar condition of the people of this State." The principles and methods recognized in the Rauhen House and Mettray School may be inferred from the following statement: The "Colonie Agricole," at Mettray, near Tours, in France, was founded in 1839 as an institution for the reformation and training of children liable to become vicious and criminal. Besides receiving instruction in the necessary school studies, they are taught various useful occupations, such as farming, and the trades of the wheelwright, blacksmith, joiner, carpenter, mason, shoe-maker, wooden-shoe-maker, tailor, rope-maker, sail-maker, etc.

The Reform School of the "Rauhen House," at Horn, near Hamburg, was founded in 1833. Here as at Mettray, the "family system" is maintained. The labor performed includes house-keeping and home-work, field and garden culture, and such occupations as shoe-making, making and mending clothes and bedding, carpentry and wooden-shoe-making, woolen-thread

spinning, baking, masonry and painting, house-keeping and basket-making. There are also workshops for printing, book-binding, lithographing, stereotyping and wood-engraving. The girls fill the places of servants, cooks, washerwomen, ironers, laundry-women and seamstresses. The younger girls help the older, make and mend coarse linen, knit and mend stockings, etc.

The German Government has long sought to make industrial pursuits reputable and universal. To this end, members of the royal family have practiced as well as preached the gospel of honest work. In Carlsruhe, I learned of an excellent girls' school in the *Schloss*, in which the Grand Duchess of Baden, the only daughter of the Emperor of Germany, had recently placed her young daughter, with instructions that she should be excused from none of the household industries required of the other pupils, that she should be trained in sewing and knitting, and made as thorough a seamstress as if she were to earn her livelihood by her needle. During her school life she is not to be distinguished by any of the high titles which she may bear in after life. In all respects she is to be on a par with her young companions, receiving no favoritism in view of her rank, but to WORK and play, run and romp, give and take on perfectly equal terms with her companions, and receive exactly the same punishments if remiss in study or work. The present Crown Prince of Prussia early learned the cabinet makers' trade, and at Babelsberg near Potsdam, the Summer Palace of the Emperor of Germany, are shown articles of furniture of superior workmanship made by him. His cousin, Prince Frederick Charles, learned the trade of glazier, and became quite artistic and enthusiastic in his craft. Fine specimens of his work may be seen in the Potsdam Palace consisting chiefly of colored glass tastefully joined together by means of lead and tin strips like the fine colored memorial glass windows so often found in churches. Such examples of honoring industry have exerted a vast and beneficent influence throughout the German Empire.

EDUCATION AND LABOR.

The great majority of our pupils must work for a living. By the ordinance of Heaven, the necessity of labor is well-nigh universal. Nature and history alike confirm the old decree, "In the sweat of thy face shalt thou eat bread." Teachers and school officers should carefully inquire whether our schools are accomplishing all they ought to do for the working classes. It is a grand result that all are trained to read and write and cipher, and learn something of the other common rudiments. In no part of the world, except Germany, are there so few *native* illiterates as in New England.

The general intelligence of the people is one obvious cause of our exemption from the railway strikes of last summer. The sober second thought prevailed here, while madness ruled the hour elsewhere. But beneficent as has been the influence of the public school in New England, it has by no means done its whole duty to the laboring classes. More should be said and done to dignify labor and prepare our youth to become skilled workmen as well as industrious and upright citizens. It is a mistake to suppose that education need create any aversion to labor, or that those who do the roughest work need the least schooling.

Under the system of slavery in the South, and until recently with the serfs of Russia and the equally illiterate farm hands of England, it was held as an axiom that schooling would make laborers discontented, restless and unprofitable servants, and that universal education would render manual labor distasteful and disreputable. Too much of this mischievous legacy of slavery lingers among us still. The silly and wicked notion that labor is menial ought to be refuted in our schools, where our youth should be early taught the necessity and dignity of labor, as the primal source of all human excellence and progress. Girls as well as boys should be early taught both in the family and school that to learn to be useful

is alike their duty, privilege and interest. Education should thus be made the auxiliary of labor. Instead of treating it as a degrading drudgery, education should elevate labor and render it more skillful and productive. If the true bearing of education on industry was taught in our schools, our youth would grow up under the salutary conviction that education is economy, and so far from degrading labor makes it more inviting and profitable, because the skilled workman so forecasts his plans that every blow tells, thus economizing his time and strength and stock, and even in the humblest work, accomplishing more, in better style, and with less damage to tools or machinery, than the boor who can use only brute muscle. Pride in one's work leads to higher excellence both in his craft and character. The skilled artizan who delights to do his best to-day, will aspire to do better still to-morrow. On the other hand, the too common theory that labor is a degrading drudgery will consciously demean any workman and bar improvement in his trade.

Connecticut is a busy hive of manufactories. The industrial interests of no State are more vital to its prosperity. We are a working people, and the cause of the workman is the cause of all. The problem of our State and of our day is to elevate work by educating and thus elevating the workmen. The masses are learning that mere muscle is weak, that brains help the hands in all work, that knowledge multiplies the value and productive power of muscular efforts. If knowledge is power, ignorance is waste and weakness. What a man *is*, stamps an impress upon what he does, even in the humblest forms of industry. The character of the work depends upon the workman. Whatever elevates the laborer improves his labor. In proportion as you degrade the operative even to the degree of serf or slave, you depreciate his work. You can dignify work therefore in no way so surely as by elevating the workman. The wealth and welfare of individuals and States, always dependent on labor, can be most fully secured only by educated labor. If rightly conducted, our schools, so far from breeding discontent with the humblest pursuits, will prepare for success in the ordinary callings of life.

Instead of this, I find in some cases the chief aim is promo-

tion to the next higher grade, and from that up to the highest or High School, and the programme is planned for those who complete the full curriculum, rather than for the majority who withdraw early for work or business. It is worthy of inquiry whether at each successive step the conditions of promotion may not wisely include the same studies and attainments which constitute the best preparation for the business of life, as well as for higher grades in school.

How to secure the best results with the least cost of time as well as money is a problem not yet fully solved. Our text books, now too voluminous, should comprise less of minute details and more of practical methods and principles. Such topics in arithmetic as the least common multiple of common fractions, casting out of nines in multiplication and division, alligation medial and alternate, and commutation of radix, may well be omitted in a common school course, or briefly noticed in the appendix. Those and kindred topics, of no use in ordinary business, fill a large space in nearly all the arithmetics. They have a traditionary sanction. In continuing them the authors have consulted usage more than utility. Like the titled scions of rank in the old world, they have come down by so long a literary descent that no one disputes their right to their honored place. Worth more than all these complicated processes is the thorough mastery of the ground rules. In all our schools rapid mental combinations should be daily practiced till pupils can add, multiply and divide with the utmost facility and accuracy. This done, the rest of arithmetic will be comparatively easy and pleasant.

Ex-President Thomas Hill justly complains that our "Arithmetics have been expanded until the unfortunate pupil is lost in a wilderness of words, and does not find his way through, in time to learn to cipher. The science of arithmetic receives so much attention that the art is neglected. Life is not long enough to spend so long a proportion of it on arithmetic as is spent in the modern system of teaching it, and arithmetic is too valuable an art to have our children neglect to acquire facility in it, instead of being stupefied and disgusted with premature attempts to understand it as a science." It is certainly a useless repetition to require children to learn, for example, explana-

tions of the first principles of fractions, percentage and the like as they are scattered through four or five volumes, each successive series setting forth the same subjects only with greater fullness and complication. In many schools arithmetic is thus made a subject of study for eight or nine years, when three or four years ought to give the pupil the mastery of the essentials, including rapid mental combinations. He should learn the multiplication table early and thoroughly, and acquire great rapidity in all practical processes.

By the condensation or omission of too extended serial books in geography, grammar and arithmetic, and in the latter study mastering thoroughly only the practical portions and postponing the intricacies of compound proportion, permutation and the like, that not one in a thousand ever uses in the practical business of life, more time can be gained for reading, spelling, writing, the study and use of our own language, composition, at least in letter writing, and elementary lessons in the practical sciences, natural history, political economy, and the history of our own country.

WHAT BOYS ARE READING.

A timely appeal to the public has just been made, bearing the signatures of eminent citizens of New Haven who represent both political parties and the Baptist, Roman Catholic, Congregational and Episcopal churches. I welcome this warning, as I have had occasion to observe widely the pernicious influence of bad books and papers. Finding ten years ago that such papers as the *Boston Illustrated Police News*, the *New York National Police Gazette*, and *Day's Doings* were freely sold in the cars, I addressed a letter to the President or Superintendent of every railway in Connecticut asking if I might announce *authoritatively* in my next Report that "the sale of immoral papers is not permitted in the cars or stations of your railway." Cordial replies came promptly from the officers of every railroad of our State expressing their earnest purpose to do their part in the suppression of this great evil. One reply shows the spirit of all. "I fully appreciate your views and most heartily concur in your wish, and will do my utmost to prevent the circulation of such papers." Obscene books, papers and pictures are the worst of outlaws. The most indecent of this class are sold clandestinely. But there are others, sold openly, like those named in the following "appeal," which though less filthy, are more corrupting, if not more infamous than the most lecherous issues of the Parisian press. The poison which nauseates by an overdose, may be its own antidote. Professing to be illustrated histories of the week, these papers are in fact chroniclers of, or contributors to, the bar-room and the brothel. The safety of our youth now demands the utmost effort for the exclusion of such contamination. In behalf of the children of the State, I earnestly invoke the aid and coöperation of all parents, the officers of justice, the public press, and of all good citizens, in efficient measures for the suppression of the evil so well set forth in the following appeal and extracts from the paper of Professor Sumner.

"We desire to call attention to the cheap, trashy literature which is demoralizing the youth of our country. In this class we notice the paper named *The New York Boys' Weekly*, with a reputed circulation of 40,000, and *The Boys of New York*, with a reputed circulation of 50,000. These papers contain stories of the most sensational and slangy character, judging by the titles, of which we name the following: 'Dashing Dick, King of the Highway,' 'Yankee Claude Duval, the Dashing Knight of the Road,' 'Corkey, or the Tricks and Travels of a Supe,' 'Shorty, jr., or the Son of his Dad,' 'Bang Up, or the Boy Ranchero,' etc., etc. We see not one redeeming trait in these or other papers of this class. We are informed that many of the advertisements in their columns are of the most villainous kind. Will you not do what you can to warn your readers against the peril that besets our youth? We inclose Professor Sumner's article, reprinted from *Scribner's Monthly*, which we beg you to use according to your judgment in whole or in part.

Our object is not to advertise any periodical in place of those we deprecate, but only to warn the public of a danger suspected by few and realized by fewer still.

NOAH PORTER,	LEONARD BACON,
THEODORE D. WOOLSEY,	FRANCIS WAYLAND,
WILLIAM M. BARBOUR,	HUGH CARMODY,
JAMES E. ENGLISH,	EDWIN HARWOOD,

FRANCIS A. WALKER."

"Few gentlemen, who have occasion to visit news-offices, can have failed to notice the periodical literature for boys, which has been growing up during the last few years. The increase in the number of these papers and magazines, and the appearance, from time to time, of new ones, which, to judge by the pictures, are always worse than the old, seem to indicate that they find a wide market. Moreover, they appear not only among the idle and vicious boys in great cities, but also among school-boys whose parents are careful about the influences brought to bear on their children. No student of social phenomena can pass with neglect facts of this kind,—so practical, and so important in their possible effects on society.

These periodicals contain stories, songs, mock speeches, and

negro minstrel dialogues,—and nothing else. The literary material is either intensely stupid, or spiced to the highest degree with sensation. The stories are about hunting, Indian warfare, California desperado life, pirates, wild sea adventure, highwaymen, crimes and horrible accidents, horrors (tortures and snake stories), gamblers, practical jokes, the life of vagabond boys, and the wild behavior of dissipated boys in great cities. This catalogue is exhaustive. There are no other stories. The dialogue is short, sharp, and continuous. It is broken by the minimum of description and by no preaching. It is almost entirely in slang of the most exaggerated kind, and of every variety,—that of the sea, of California, and of the Bowery; of negroes, 'Dutchmen,' Yankees, Chinese, and Indians, to say nothing of that of a score of the most irregular and questionable occupations ever followed by men. When the stories even nominally treat of school-life, they say nothing of *school*-life. There is simply a succession of practical jokes, mischief, outrages, heroic but impossible feats, fighting, and horrors, but nothing about the business of school, any more than if the house in which the boys live were a summer boarding-house. The sensational incidents in these stories are introduced by force, apparently for the mere purpose of producing a highly spiced mixture.

One type of hero who figures largely in these stories is the vagabond boy, in the streets of a great city, in the Rocky Mountains, or at sea. Sometimes he has some cleverness in singing, or dancing, or ventriloquism, or negro acting, and he gains a precarious living while roving about. This vagabond life of adventure is represented as interesting and enticing, and, when the hero rises from vagabond life to flash life, that is represented as success. Respectable home life, on the other hand, is not depicted at all, and is only referred to as stupid and below the ambition of a clever youth. Industry and economy in some regular pursuit, or in study, are never mentioned at all. Generosity does not consist in even luxurious expenditure, but in wasting money. The type seems to be that of the gambler, one day 'flush' and wasteful, another day ruined and in misery.

There is another type of boy who sometimes furnishes the

hero of a story, but who also figures more or less in all of them. That is the imp of mischief,—the sort of boy who is an intolerable nuisance to the neighborhood. The stories are told from the stand-point of the boy, so that he seems to be a fine fellow, and all the world, which is against him, is unjust and overbearing. His father, the immediate representative of society, executes its judgments with the rod, which again is an insult to the high-spirited youth, and produces on his side, either open war, or a dignified retreat to some distant region.

These stories are not markedly profane, and they are not obscene. They are indescribably vulgar. They represent boys as engaging all the time in the rowdy type of drinking. The heroes are either swaggering, vulgar swells, of the rowdy style, or they are in the vagabond mass below the rowdy swell. They are continually associating with criminals, gamblers, and low people who live by their wits. The theater of the stories is always disreputable. The proceedings and methods of persons of the criminal and disreputable classes, who appear in the stories, are all described in detail. The boy reader obtains a theoretical and literary acquaintance with methods of fraud and crime. Sometimes drunkenness is represented in its disgrace and misery, but generally drinking is represented as jolly and entertaining, and there is no suggestion that boys who act as the boys in these stories do ever have to pay any penalty for it in after life. The persons who are held up to admiration are the heroes and heroines of bar-rooms, concert saloons, variety theaters, and negro minstrel troupes. From the specimens which we have examined we may generalize the following in regard to the views of life which these stories inculcate, and the code of morals and manners which they teach:

The first thing which a boy ought to acquire is physical strength for fighting purposes. The feats of strength performed by these youngsters in combat with men and animals are ridiculous in the extreme. In regard to details the supposed code of English brutality prevails, especially in the stories which have English local color, but it is always mixed with the code of the revolver, and, in many of the stories, the latter is taught in its fullness. These youngsters generally carry revolvers and

use them at their good discretion. Every youth who aspires to manliness ought to get and carry a revolver.

A boy ought to cheat the penurious father who does not give him as much money as he finds necessary, and ought to compel him to pay. A good way to force him to pay liberally, and at the same time to stop criticising his son's habits, is to find out his own vices (he always has some) and then to levy black-mail on him. Every boy, who does not want to be 'green' and 'soft,' ought to 'see the elephant.' All fine manly young fellows are familiar with the actors and singers at variety theaters, and the girl waiters at concert saloons. As to drinking, the bar-room code is taught. The boys stop in at bar-rooms all along the street, swallow drinks standing or leaning with rowdy grace on the bar. They treat and are treated, and consider it insulting to refuse or to be refused. The good fellows meet every one on a footing of equality—above all in a bar-room.

Quiet home life is stupid and unmanly. Boys brought up in it never know the world or life. They have to work hard and to bow down to false doctrines which parsons and teachers in league with parents, have invented against boys. To become a true man, a boy must break with respectability and join the vagabonds and the swell mob. No fine young fellow, who knows life, need mind the law, still less the police. The latter are all stupid louts. If a boy's father is rich and he has money, he can easily find smart lawyers (advertisement gratis) who can get the boy out of prison, and will dine with him at Delmonico's afterward. The sympathies of a manly young fellow are with criminals against the law, and he conceals crime when he can. Whatever good or ill happens to a young man he should always be gay. The only ills in question are physical pain or lack of money. These should be borne with gayety and indifference, but should not alter the philosophy of life.

As to the rod, it is not so easy to generalize. Teachers and parents, in these stories, act faithfully up to Solomon's precept. When a father flogs his son, the true doctrine seems to be that the son should run away and seek a life of adventure. When he does this he has no difficulty in finding friends, or in living by his wits, so that he makes money, and comes back rich and glorious, to find his father in the poor-house.

These periodicals seem to be intended for boys from twelve to sixteen years of age, although they often treat of older persons. Probably many boys outgrow them and come to see the folly and falsehood of them. It is impossible, however, that so much corruption should be afloat and not exert some influence. We say nothing of the great harm which is done to boys of that age, by the nervous excitement of reading harrowing and sensational stories, because the literature before us only participates in that harm with other literature of far higher pretensions. But what we have said suffices to show that these papers poison boys' minds with views of life which are so base and false as to destroy all manliness and all chances of true success. How far they are read by boys of good home influences we are, of course, unable to say. They certainly are within the reach of all. They can be easily obtained, and easily concealed, and it is a question for parents and teachers how far this is done. Persons under those responsibilities ought certainly to know what the character of this literature is."

WHAT SHOULD OUR BOYS READ?

Teachers can largely determine the reading of their scholars out of school. It is important not only to awaken a love of books, but to guide in their selection and form a taste for profitable reading. Scholars should be encouraged to have some good book always at home, in which they read a little every day. In school they should be invited to tell what they have read. To give an epitome of one's reading is an admirable school exercise. The pupil will peruse a book with ten-fold greater interest, when expecting to epitomize his author before the school. As a drill of memory and in language it is a most useful exercise, and is one that is sure to interest as well as profit the school. Having experienced these advantages in my own teaching, and witnessed them in many schools, I strongly recommend this practice, already adopted by some, to all the teachers of Connecticut. Instead of giving here a list of books for all the youth of the State, I advise teachers to recommend well known works in adaptation to the age, taste and advancement of individual pupils, usually those which they themselves have read, that they may the better appreciate and criticise the epitomes of the same by the pupils.

An eminent teacher recently asked a class of fifty-seven boys, What is the last book you have read? One answered "I haven't read any lately," another, "I don't remember," "can't tell" said a third. But the great majority were able to give an account of their reading which was most creditable to their teacher, evincing his wholesome influence over his pupils outside of the school room. Twenty-seven had been reading works of history and biography, including Life and Times of Benjamin Franklin, Life of Prescott, Higginson's History of the United States, Irving's Washington, Lives of Cicero, Hannibal, Cæsar, Xerxes, Alexander, Ferdinand and Isabella. Three boys were reading Dickens' History of England and one was enjoying Bancroft's ten volume History of the United

States, another had just read three volumes of Macaulay's Essays. Shakespeare, Bunyan, Bulwer, DeFoe, Jules Verne and Oliver Optic had one reader each. What Career?, Avis, Marble Fawn, History of Propellers, Management of Horses, Seven Oaks, Miss Mühlbach's Empress Josephine, Ways of the World, Half-Hour Natural Science Series, American Explorers, Little Men, Speke's Sources of the Nile, Wide Wide World, Waverly, Fortunes of Nigel and Quentin Durward were also named.

I invite our teachers to test their scholars in the same way during the present year, and to send me lists of the books read by their pupils. With the coöperation of teachers and school officers we may learn what the youth of Connecticut are reading. This effort will enlist the attention of parents and secure their aid in the selection of better books and periodicals for their children, and thus check a growing evil and accomplish great good. Teachers should foster a taste for such choice literature, that travels, histories and biographies, books of science, genuine poetry, essays and choice romances shall take the place of the "blood and thunder" stories and other emphatically *weekly* novelettes of the day.

Social reading should also be encouraged. The industry in many a sewing circle has been enlivened by well selected reading by one of their number. The same genial influence should often cheer the circle around the family hearth. "Reading circles" ought to be maintained in every town, where selections in prose or poetry, often a play of Shakespeare, the several parts having been previously assigned, and made the subject of careful private study and drill, are rehearsed together. These Reading Clubs, where each thoroughly studies his part or selection till he becomes so possessed of its thought and spirit as to render it in the best style he can command, not only cultivate the art of elocution, but improve the taste and develop a higher appreciation of the best authors. Aside from the educational value of this class of evening schools, their social influence is happy. Divided as the residents of our rural districts too often are, by party or sect, by prejudice or neighborhood difficulties, every influence tending to fraternize the people should be welcomed; every association where they meet on common ground for mutual improvement, and where kindly

feeling and social amenities are cultivated, should be encouraged.

The teacher cannot awaken love of books unless he himself continues to be a student. Any one who thinks he knows enough to teach even the humblest class, should never profane the school room by his presence. One who has ceased to be a learner cannot be a good teacher. The more one has discovered, the more he wants to know. The truly learned man feels the greatness of his ignorance and the littleness of his knowledge as but a drop out of the boundless ocean of truth. It has been well said, "the greater the circle of our knowledge, the greater the horizon of ignorance that bounds it. The pride of wisdom therefore is the proof of folly." Arrogance and assurance are not the fruits of true learning. Yet from the days of Johnson to Dickens "the school master" has been characterized in our literature as magisterial, opinionated and dogmatical. Associated as teachers are with beginners, or at least inferiors in attainments, seldom called to the grapple of mind with mind as in forensic contests with equals or superiors, there is great danger of imbibing the spirit of conceit and dogmatism, even when only getting deeper in the old ruts. What is dryer than an old, opinionated, self-satisfied, unprogressive school master? He despises "all your new-fangled notions." He glories in the "good old ways." His fluent routine feeds his complacency, though it really enervates his own mind and stupefies his pupils. Whoever either in the college or primary school has ceased to learn, should by all means stop teaching, for children need impulse even more than instruction. Any one who no longer thirsts for higher knowledge, cannot fitly lead even the youngest to its fountain. As a teacher, one must be progressive, or cease to be at all. The mind that stagnates must soon retrograde, and such a teacher would stultify rather than stimulate his class. Happily there are now many teachers worthy of their work, whose ideal is high, and who are enthusiastic in the life-long work of personal culture. The efficient coöperation of such teachers I confidently anticipate in the efforts now making to stimulate a taste for books, and aiding our youth in the selection of the best books. One who early acquires a taste for reading and a love of books, will realize that his education

is only begun when his school days are ended. To complete it will be the aim and ambition of his life. Let his calling be what it may, with an insatiable desire for knowledge, he will find leisure for self-improvement. The many instances of self-educated men whose eminence and success are due to an early taste for reading, should be given to the boys who are just entering the active pursuits of life, and who are so apt to think that they can no longer find time for self-culture. But is the little leisure they have well improved? Should the evenings be idled away, because the days must be occupied with business or labor? The youth whose teachers have trained them to always have a good book at hand for odd moments, will enter the practical callings of life with a habit of inestimable importance.

COMPULSORY EDUCATION IN ENGLAND.

My observations during the last year, both at home and abroad, refute the old objection to obligatory education, that "the laboring classes won't stand it." In the County and State Conventions of the Labor Unions recently held in Connecticut, resolutions have been adopted in favor of the rigid enforcement of the law for the prevention of illiteracy. Mixing much with the laboring classes for the purpose of promoting school attendance, I have been greatly encouraged by their growing appreciation of education, whether Americans, Germans, Swedes or Irish. In England the various labor organizations earnestly advocate compulsory education. The opposition comes from the comparatively few land-holders, the politicians and large farmers. In Glasgow, where the coercive regime is in full vigor, but fifty-one penalties have been inflicted in three years. In Birmingham, where the proportion of illiteracy was far larger than in Glasgow, greater exertions have been requisite to vanquish the apathy of parents. In Scotland, education has long been well nigh universal, while the poorer classes in England and Wales were sunk in ignorance. Under the existing law, the regulation of attendance is left to the local School Boards. Recent interviews with prominent friends of education in England and Scotland, satisfied me that public sentiment is rapidly growing in favor of making compulsion universal in its application. I could learn of no signs of reaction in any town where it had been adopted, but was assured that in the School Boards of London, Glasgow, Manchester, Birmingham, Sheffield, Leeds and many other large towns there is not now left a single opponent to this plan. Throughout Britain experience has converted many objectors to friends.

Sir Charles Reed, President of the London School Board, gave me last summer some statements which happily illustrate the good influence of compulsory education in that great metropolis. The new system went into operation in 1871. The

school census then taken enumerated 574,693 children of school age, and needing elementary education. For these children only 262,259 school places were at that time provided, and there were 312,434 more children than places. Over two hundred new school houses have been provided since that date, and now the Board Schools and Voluntary Schools have accommodations for 505,323. The compulsory law has worked with little friction and marked success. As a result, there has already been a very considerable reduction in the cost of juvenile crime and pauperism. The magistrates of London and the Commissioners of Police have all borne cordial testimony to the fact that there has been a great diminution of juvenile offenses, and that every gang of young thieves known to the police has been broken up. The Superintendent of the Holloway Prison says the juvenile criminals have yearly decreased so that instead of 136 males and 21 females admitted in 1869, the numbers for the last year were only 28 males and no females. In 1871 Hon. W. E. Forster, the father of the new educational bill said to me, "In America you can have little idea of our difficulty in dealing with these myriads of street Arabs in London, who are so degraded and ignorant that they and their parents alike can appreciate neither the evils of ignorance nor the advantages of education." One of the inspectors now says, "These street Arabs sit side by side with the sons of industrious citizens, and so healthful is the tone of the school that complaints are seldom heard. These schools are of the deepest interest and first importance, receiving children from indigent and neglected homes, and supplying all that perhaps they will ever obtain of moral training and cultivation in head and heart. No one can continue to visit these schools and notice the sad state of these children at the outset without observing the gradual ameliorating effects of the care bestowed upon them."

By invitation of Sir Charles Reed, I witnessed in July last, the gathering of 5,000 of these children in Crystal Palace. The spectacle of so many children seated in ascending tiers in a semi-amphitheater near the great organ was itself inspiring, and the grand choral singing, especially considering the brief period of their school attendance was excellent. Besides the

5,000 singers, there was an enormous crowd of other children and their parents, the total number, said the President of the Board, was over 30,000. The Crystal Palace Company gave free admission to the children. Tom. Hughes, the President of the Company, made a speech of cordial welcome to all, and congratulated and commended the School Board that had already accomplished so noble a work. The main speech was given by Lord Sanden, a single sentence of which indicates the moral influence already exerted by the London schools. "When we think of the future of the children before us and of the various lots in life which will become theirs, it is impossible not to be deeply affected, or to look at these children without being grateful to Sir Charles Reed and his colleagues, for bringing these children into school, who might otherwise have been left in the streets, a plague to their parents and a danger hereafter to the State." Similar facts might be given as to the good influence of compulsory education in many other cities of England, and especially in Birmingham, the head-quarters of the National Educational League,—an association embracing such men as George Dixon, M.P., and Dr. R. W. Dale,—which has been active and influential in the advocacy of educational reforms. Visiting most of the schools of that city last summer, I gained ample proofs of the good effects of obligatory instruction, as there rigidly applied.

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